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MOUNTAIN MYXOMYCETES

T. H. Macbride

Slime moulds are such ubiquitous things that we might imagine all species universally distributed and the forms of one locality precisely those of every other, once the lists are with accuracy compared. This might well be the case indeed since these forms are manifestly sown by wind currents, their spores swept by every aerial movement, probably round and round the world.

Furthermore, slime moulds, in the nature of the case, are essentially woodland things; they affect the shade, love rotting logs and piles of fallen leaves, and one might expect to find them alike in all the forests of the continent. But such is by no means the situation. These curious heirs of primitive life differ in different forests, and vary from mountain range to mountain range, and up and down the meridians of the world, quite as do the higher plants. They respond readily to environmental change and become fixed at length in haunt and habitat.

The variation is accordingly more marked where isolation and climatic differentiation are more complete. Thus there is more concord if we compare the forests of Maine and Washington than when we attempt to study together the Rocky Mountains and the Cascades. Maine and Washington are near the ocean; the Rocky Mountains are far interior; the mountains about Puget Sound are visited by abundant rains, the Rocky Mountains are semi-arid; stretch across the "great American desert."

This opens a wide subject. It is not expected here to do more than call attention to the problem. This we may effect by presenting briefly the slime-mould species of the two regions latest named, comparing particularly Colorado and the shores of Puget Sound. Most of the work in Colorado has been done by Professor E. Bethel and Professor W. C. Sturgis; I myself have been busy on the Pacific coast. For some reason, not clear to me at present, the Colorado field is remarkable for its wealth of calcareous types: at least in the light of present knowledge, the physarums and their kin abound in the Rocky Mountains about Denver and are scarce in the far West. Conversely about Puget Sound the trichia and lamproderma types are practically universal and dominant.

A few notes of species, cited in detail, may make this situation clear.

The one calcareous slime-mould everywhere in the west from the islands of San Juan to the glaciers of Mt. Rainier is the familiar *Fuligo, F. septica* L., we must finally say. So far as my observation goes, in the Washington forest every day from July to January, but one phase of the species is to be found, viz.: *F. ovata* Schaeffer. Generally specimens are rather small, but on the foot hills of the great mountain they are not only abundant but extremely large. On decaying stumps in a hemlock forest the yellow plasmodia seemed to affect the landscape, so many of them all around, so large, that the foamy plasma might have been dipped up with a cup!

In contrast with this we have in Colorado three described species, and no knowing how many phases of these species, in the protean genus. The species are distinguished chiefly by spore-characters. Thus, *F. septica* L. has spores almost smooth, pale violaceous 6–7 μ; *F. ellipsospora* R. has spores ellipsoidal, dark-colored, rough, 10–12 μ; *F. megaspora* Sturg., spores globose, very dark and rough, 18–20 μ. There is still another form repeatedly taken in Colorado with globose spores dark-colored and rough, about 10–12 μ in size. This is dull gray and fits in between the first and third named, and might be called *F. media.*

We have in the west beautiful colonies of *Lepidoderma,* probably *L. tigrinum* (Schrad.) R.; in the Rocky Mountain district this is reported "found but once in Colorado." This is a calcareous type, it is true, but looks rather in the direction of *Stemonitis.*

But it is in the great genus *Physarum* itself that the contrast becomes more apparent. Here the Colorado lists include some twenty-two species to which the Iowa herbarium may add one or two. Here is one that we may call *Physarum elegans,* very much like *P. pusillum* (Berk.) Lister, but with larger, orange or brown, short-stalked, sporangia. Here is another that has porcelain-like walls, uniform capillitum with the usual violaceous rough spores, but unlike anything in the *P. nephroideum* group. Other calcareous genera are equally represented: there are about eight didymiums, four or five didermas, etc.

Mucilago spongiosa (Leys) Morg. in the forests about Mt. Rainier is not at all uncommon. Its flecks of spume sometimes deck the stems and twigs of living plants all along a water-course. The light calcareous foam blows away as soon as dry, and leaves a curious dendritic, strangely intricate, grayish fructification quite confirming Rostafinski's figure 175. In Colorado, on the other hand, the same species retains its limey covering, shows almost no internal structure, and is almost as firm as the substratum, justifying Professor Sturgis when he writes var. *solida.*

To nearly all the Colorado forms so far discussed, one remark applies: they are peculiar. Even where representing species widely known and studied, the Rocky Mountain gatherings would nearly all be subject of remark no sooner seen. Furthermore the peculiarity is, I believe, in many cases referable to the abrupt alternation in Colorado climate. Plasmodia called into being by the melting snows of early summer are often checked in complete development by the dry atmosphere suddenly encountered as they rise to fruit, and abnormality is the result. The most normal presentations I have from Colorado are of those species which habitually fruit in less exposed positions, as on the lower side of stems, logs or heaps of mouldering vegetation. Such species are *Badhamia utricularis* (Bull.) R.; *Comatricha nigra* (Pers.) Schr.

The *Fuligo* species cited are worthy of further notice. It is of course observed that the spores in the three more closely related forms are singularly graded in size; thus—*F. septica,* 6–7 μ; *F. media,* 10–12 μ; and *F. megaspora,* 18–20 μ.

Knowing what we do, by the researches of Harper, concerning the cytology of *Fuligo,* this correlation in size is very suggestive. Professor Harper has shown that the uninuclear spore is the issue of a peculiar plasmodical cleavage, whose progress in a given case may be arrested almost anywhere; so that we might have reproductive bodies by this process ranging from large sclerotia to the smallest spores.

Turning now to the Puget Sound collections, it is to be noted that we have from both Oregon and Washington less than a dozen physarums, three didymiums so far and only three or four didermas, and these not abundant. On the other hand cribrarias are on every log, and although the number of species of *Trichia* or *Hemitrichia* is not large, the number and extent of their colonies is surprising. *T. decipiens* and *T. botrytis* are the common types, but neither is like forms of the same species as presented in the central parts of the continent. They are in every case larger; they open in sharply circumscissile fashion, standing in colonies often several feet in extent. *T. botrytis,* if such it be, is not quite Persoon's species, it is not botryoid at all. I have never seen so many as two sporangia adhering. Later on, the large empty vases of both species stand long, quite like those of *Hemitrichia clavata.*

But robust comatrichas and lamprodermas are the striking features of the myxo flora about Puget Sound. These are everywhere; lamprodermas at sea-level and comatrichas on the mountains; on Mt. Rainier up at the last limit of the firs, 8–9,000 ft., I found *C. nigra* (Pers) Schr. and especially *C. suksdorfii* Ell., beautiful and abundant sepcimens. Stemonitis species are few and rare; the colonies feeble when found, except at low levels where at least two species occur, but not *S. splendens* R.

At 7,000 ft. *Arcyria vitellina* Phill. particularly the form *A. versicolor* occurs in wide colonies of large sporangia, twice the size of those seen in Colorado. *A. versicolor,* is olivaceous yellow with touches of dull red. *A. vitellina,* pure yellow, is in Colorado and Southern California.

But the lamprodermas of the Mt. Rainier neighborhood are, as just stated, all a surprise. They all merit Ellis's name *robusta,* and their far stretching colonies all gleaming in marshalled and metallic splendor are beautiful to behold.

In fine, not to prolong this argument, so far as present knowledge goes, the slime-mould floras of the two mountain regions named are distinct as the mountains themselves. Dominants and recessives no doubt play their respective parts, but meteoric environment ultimately casts the die.

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